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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/772,893	02/04/2004	Pravin K. Narwankar	008209	5371

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APPLIED MATERIALS, INC.
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Santa Clara, CA 95052

EXAMINER

STOUFFER, KELLY M

ART UNIT	PAPER NUMBER
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1792

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/772,893	Applicant(s) NARWANKAR ET AL.	
	Examiner KELLY STOUFFER	Art Unit 1792	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 21 December 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,3,4,6-12,15,17-22,24 and 26-42 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,3,4,6-12,15,17-22,24 and 26-42 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Arguments

Due to the amendments filed 21 December 2007, the objections to the oath/declaration and specification have been withdrawn. Applicant's arguments have been considered but are moot in view of the new ground(s) of rejection necessitated by amendment.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1, 3-4, 6-12, 14-15, 17-22, 24, and 26-42 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The independent claims (except 38) and dependant claim 41 contain the limitation of "without forming a tail to the bottom surface of the dielectric film". Similarly, claim 38 contains the limitation "wherein the dielectric film does not comprise nitrogen". The applicants' disclosure does not indicate that the applicants' had possession of these features at the time of the invention. Any negative limitation or exclusionary proviso must have basis in the original disclosure. The mere absence of a positive recitation is not a basis for an exclusion. *Ex parte Parks*, 30 USPQ2d 1234, 1236 (Bd. Pat. App. &

Inter. 1993). See MPEP § 2163 - § 2163.07(b) for a discussion of the written description requirement of 35 U.S.C. 112, first paragraph. The remainder of the claims are rejected as being dependant upon a rejected base claim.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to

Art Unit: 1792

consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1, 3-4, 6-9, 12, 14-15, 17, 24, 26-28, 31, 33-35 and 37-42 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bensahel et al. (WO99/043023 -- US Patent 6372581 to Benashel et al. is used as a translation of WO99/043023 for the purposes of this rejection as it is a 35 USC 371 application of WO99/043023)

As to claim 1, Bensahel et al. discloses a method of forming nitrogen-containing dielectric film comprising incorporating nitrogen into a dielectric film using NH_3 (column 1 lines 23-25 -- though it is not preferred its utility as a nitriding gas is disclosed and may be interchanged with NO used in Bensahel) and a RTP anneal wherein the nitrogen forms on peak on the surface of the dielectric film (Figures 2 and 3, also examples). Though Bensahel does not explicitly teach without forming a tail to the bottom surface of the dielectric film, one of ordinary skill in the art would recognize that it is obvious that this will occur if the film thickness is greater than those graphed in Figures 2 and 3.

As to claim 3, Bensahel et al. desires localization of the nitrogen to the interface of the nitrided film. Though the percentage of nitrogen present is not explicitly stated by Benashel, one of ordinary skill in the art would recognize that the amount of nitrogen present in the film will be minimized until this is achieved, absent evidence showing criticality for the percentage of nitrogen claimed. It has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or

Art Unit: 1792

workable ranges involves only routine skill in the art. *In re Aller*, 220 F.2d 454, 105 USPQ 223 (CCPA 1955).

As to claim 4, the film is less than or equal to 12 angstroms (column 3 et seq.).

As to claim 6, the dielectric is silicon dioxide (column 2 lines 60-67).

As to claim 7, silicon oxynitride is formed (column 2 lines 60-67).

As to claim 8, the limitations are taught as discussed above, and Bensahel et al. additionally discloses an oxide capping layer in the Examples.

As to claim 9, the RTP process described in Bensahel et al. uses the claimed temperatures (column 1 lines 35-55).

As to claim 12, Bensahel et al. includes the provisions of the process as discussed in claim 1 and a post annealing process (column 3 lines 1-5).

As to claim 14, Bensahel et al. desires localization of the nitrogen to the interface of the nitrated film. Though the percentage of nitrogen present is not explicitly stated by Bensahel, one of ordinary skill in the art would recognize that the amount of nitrogen present in the film will be minimized until this is achieved, absent evidence showing criticality for the percentage of nitrogen claimed. It has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 220 F.2d 454, 105 USPQ 223 (CCPA 1955).

As to claim 15, the film is less than or equal to 12 angstroms (column 3).

As to claim 17, the dielectric is silicon dioxide (column 2 lines 60-67).

As to claims 24, 26-28, 31, and 38-42 the limitations are disclosed as discussed above.

As to claims 33-35 and 37, the ultra-low pressure is taught in the abstract of Bensahel et al.

Claims 10, 11, 29, 30 and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bensahel et al. in view of Niimi et al. (US Patent Publication 2002/0197884 A1)

Bensahel et al. includes the limitations of claims 10, 11, 29, 30 and 32 as discussed above except for using annealing in a non-nitridation atmosphere as the post anneal process. Niimi et al. teaches a post anneal annealing process under re-oxidizing conditions to reduce defect density of the layer and improve channel carrier mobility (also see process parameters as discussed above for this process in Niimi et al.).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Bensahel et al. to include a post anneal annealing process under re-oxidizing conditions as taught by Niimi et al. in order to reduce defect density of the layer and improve channel carrier mobility.

Claims 18-22 and 36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bensahel et al. in view of US Patent Publication 2002/0119674 A1 to Thakur.

Bensahel et al. discloses the limitations of claims 18-23 and 36 as discussed above except for using a cluster tool in the manner claimed. Thakur teaches clustering

various steps in a similar process in the manner claimed in order to reduce contamination in the oxide and other layers (paragraphs 0008 and 0034).

It would have been obvious to modify Bensahel et al. to include using a cluster tool in the manner claimed as taught by Thakur in order to reduce contamination in the oxide and other layers.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to KELLY STOUFFER whose telephone number is

Art Unit: 1792

(571)272-2668. The examiner can normally be reached on Monday - Thursday 7:00-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy Meeks can be reached on (571) 272-1423. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Kelly Stouffer
Examiner
Art Unit 1792

kms

/Timothy H Meeks/
Supervisory Patent Examiner, Art Unit 1792